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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: THREE-DIMENTIONAL, FLEXIBLE CELL GROWTH SUBSTRATE AND RELATED METHODS

(57) Abstract: An engineered cell growth substrate is provided along with an apparatus containing the substrate. The substrate contains features, including, without limitation: an extracellular matrix mimetic, areas of differing elasticity moduli and/or 3-dimensional engineered formations, such as grooves or protuberances. Methods of fabricating the cell growth substrate, methods of growing cells on the substrate, and methods of evaluating analytes on cells on the substrate also are provided.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/011796

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N5/00 C12M1/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C12N C12M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 789 601 A (BANES ALBERT J) 6 December 1988 (1988-12-06)</p> <p>column 3, line 21 - line 41 column 4, line 61 - column 5, line 49; claim 9; figures 1-6</p> <p style="text-align: center;">----- -/--</p>	<p>1-55, 57, 61-65, 71, 87-95, 98, 117-121, 132-154</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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27 October 2004

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/35990 A (PRODESCO ; GREENHALGH E SKOTT (US); KAUFMANN CAROL A (US)) 10 May 2002 (2002-05-10) page 3, line 15 - line 29 page 6, line 15 - page 8, line 9; claims 1,5,7,9-19; figures 1-6 -----	31-55, 87-95, 98, 117-121, 132-152
A	WO 91/19783 A (DU PONT) 26 December 1991 (1991-12-26) claims 1-42 -----	1-55,57, 61-65, 71, 87-95, 98, 117-121, 132-154

INTERNATIONAL SEARCH REPORT

International application No.
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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims:

1-12,13-18(part),19-55,57(part),
61-65(part),71(part),87-95(part),98
(part),117-121(part),132,133-135(part),
136-154

Cell growth substrate comprising an elastomeric membrane of a first material that comprises a first portion having a first elasticity and a second portion having a second elasticity, as well as method for preparing it, apparatus comprising it and method of culturing cells using such an apparatus.

2. claims:

13-18(part),56,57(part),58-60,
61-65(part),66-70,71(part),72-86,87-9
5(part),96,97,98(part),99-116,
117-121(part),122-131,133-135(part),1
55,156

Cell growth substrate comprising an elastomeric membrane of a first material that is at least partially coated with an extracellular matrix-mimetic, as well as a method for preparing it, apparatus comprising it and method of culturing cells using the apparatus.

3. claim: 157

A method of culturing cells comprising growing cells in a cell growth apparatus comprising a substrate comprising a first elastomeric membrane and a removable second elastomeric membrane.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4789601	A	06-12-1988	AT 144460 T	15-11-1996
			AU 1722288 A	06-12-1988
			DE 3855631 D1	28-11-1996
			DE 3855631 T2	22-05-1997
			EP 0365536 A1	02-05-1990
			JP 2528174 B2	28-08-1996
			JP 2501529 T	31-05-1990
			WO 8808789 A1	17-11-1988
			US 4822741 A	18-04-1989
			US 4839280 A	13-06-1989

WO 0235990	A	10-05-2002	AU 3094102 A	15-05-2002
			WO 0235990 A2	10-05-2002
			US 2002066360 A1	06-06-2002

WO 9119783	A	26-12-1991	CA 2084645 A1	16-12-1991
			EP 0535026 A1	07-04-1993
			JP 5507847 T	11-11-1993
			WO 9119783 A1	26-12-1991
